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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/759,180	01/20/2004	Takeshi Yamashita	740819-1041	7694
22204	7590	04/27/2006		
NIXON PEABODY, LLP 401 9TH STREET, NW SUITE 900 WASHINGTON, DC 20004-2128			EXAMINER CHEN, KIN CHAN	
			ART UNIT 1765	PAPER NUMBER

DATE MAILED: 04/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/759,180

Applicant(s)

YAMASHITA ET AL.

Examiner

Kin-Chan Chen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 21 March 2006.  
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-15 is/are pending in the application.  
4a) Of the above claim(s) 8-13 is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1,3,4,6,7,14 and 15 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 032106.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1,3, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jain et al. (US 6,180,533; hereinafter "Jain") as evidenced by Demmin et al. (US 6,635,185).

In a method for etching a trench, Jain teaches using a dry etching apparatus having a dual power source independently controlling source power and bias power. Jain teaches that a mask pattern having an opening corresponding to a region to be formed with an isolation may be formed on a silicon substrate. A process gas containing at least oxygen may be used to etch and form a trench for isolation in the silicon substrate. See col. 7, lines 8-12; 45-50; col. 19; and Table eight).

Jain teaches using separate controllers for source power and bias power in order to separately control the plasma generation and bombardment of the species onto the substrate. Therefore, the process produces good quality product and excellent critical dimension control. Hence, it would have been obvious to one with ordinary skill in the

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art that the defect of oxidation does not occur at an exposed portion of the silicon substrate. Furthermore, it would have been obvious to one with ordinary skill in the art that Jain applies the source power and bias power together (**at same time**) so as to generate the plasma and drive the reactive species to the substrate at timely manner and etch efficiently. As such, no oxidation at an exposed portion of the silicon substrate would be expected because applying the source power and bias power together (**at same time**) in Jain is same as that described in applicant's disclosure (page 12, lines 5-9; Figs. 16 and 17), therefore, it is expected to yield same result and effect.

Claims 3 and 14 differ from the Jain by specifying various values for source power and bias power, and etching speed. However, same were known to be result-effective variables and commonly determined by routine experiment. The process of conducting routine experimentations so as to produce an expected result is obvious to one of ordinary skill in the art. In absence of showing criticality, a person having ordinary skill in the art would have found it obvious to modify the prior art by performing routine experiments (by using different values of source power and bias power, and etching speed) to obtain optimal result with a reasonable expectation of success, see Tables of Jain, and Demmin et al. (col.7, lines 15-25) in the record as evidence. Demmin discloses that one skilled in the art can vary type of plasma etching, composition, flow rate, temperature, pressure, power, time and bias accordingly to etch a desired material.

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3. Claims 4, 6, 7 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yang et al. (US 6,515,328; hereinafter "Yang") as evidenced by Demmin et al. (US 6,635,185).

In a method of semiconductor device fabrication, Yang teaches using a dry etching apparatus having a dual power source independently controlling source power and bias power. Yang teaches that a conductive film containing at least silicon may be formed on a substrate. Yang teaches that a mask pattern covering a region to be formed with a gate electrode may be formed thereon. A process gas containing at least oxygen may be used to etch the conductive film and form the gate electrode. See abstract; col. 6, lines 10-22; col. 7, lines 1-10. Figs 6 and 7.

Yang teaches using separate controllers for source power and bias power in order to separately control the plasma generation and bombardment of the species onto the substrate. Therefore, the process produces good quality and improved control over the dimensions of gate electrodes. Hence, it would have been obvious to one with ordinary skill in the art that the defect of oxidation does not occur at an exposed portion of the conductive film (such as polysilicon). Furthermore, it would have been obvious to one with ordinary skill in the art that Yang applies the source power and bias power together (at same time) so as to generate the plasma and drive the reactive species to the substrate at timely manner and etch efficiently. As such, no oxidation at an exposed portion of the silicon substrate would be expected because applying the source power and bias power together (**at same time**) in Yang is same as that described in

applicant's disclosure (page 12, lines 5-9; Figs. 16 and 17), therefore, it is expected to yield same result and effect.

Claims 6 and 15 differ from the Yang by specifying various values for source power and bias power, and etching speed. However, same were known to be result-effective variables and commonly determined by routine experiment. The process of conducting routine experimentations so as to produce an expected result is obvious to one of ordinary skill in the art. In absence of showing criticality, a person having ordinary skill in the art would have found it obvious to modify the prior art by performing routine experiments (by using different values of source power and bias power, and etching speed) to obtain optimal result with a reasonable expectation of success, see Demmin et al. (col.7, lines 15-25) in the record as evidence. Demmin discloses that one skilled in the art can vary type of plasma etching, composition, flow rate, temperature, pressure, power, time and bias accordingly to etch a desired material.

### ***Response to Arguments***

4. Applicant's arguments filed March 21, 2006 have been fully considered but they are not persuasive.

Applicant has argued that the prior art does not have the bias power initiated to generate plasma before oxidation proceeds at the surface of the material containing silicon (or conductive film). It is not persuasive. As has been stated in the office action, it would have been obvious to one with ordinary skill in the art that Jain (or Yang) applies

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the source power and bias power together (at same time) so as to generate the plasma and drive the reactive species to the substrate at timely manner and etch efficiently. As such, no oxidation at an exposed portion of the silicon substrate (or conductive film) would be expected because applying the source power and bias power together (**at same time**) in Jain (or Yang) is same as that described in applicant's disclosure (page 12, lines 5-9; Figs. 16 and 17), therefore, it is expected to yield same result and effect.

***Allowable Subject Matter***

5. Claims 2 and 5 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The most relevant reference in the list of prior art cited is Koshimizu (U.S. 6,426,477) who teaches that the bias power may be supplied in advance of starting the source power (abstract; col. 1, lines 6-10). However, the filing date of Koshimizu is September 12, 2000. The priority date of the current application, which is based on Japan patent application 2000-117502, is April 19, 2000. The certified copies of the priority documents and the verified English translation of the Japan patent application 2000-117502 were submitted by applicant in parent application 09/826,098. Therefore, the Koshimizu reference is predated by the present application.

***Conclusion***

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Demmin et al. (US 6,635,185; col.7, lines 15-25) discloses that one skilled in the art can vary type of plasma etching (RIE, HDP, plasma etching..), composition, flow rate, temperature, pressure, power, time and bias accordingly to etch a desired material.

**7. THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kin-Chan Chen whose telephone number is (571) 272-1461. If attempts to reach the examiner by telephone are unsuccessful, the examiner's



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supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

April 25, 2006

K. (Signature)

Kin-Chan Chen  
Primary Examiner  
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